



Release Notes for the Cisco IP/VC 3510 MCU

September 2000

This release note describes the new features and caveats for the Cisco IP/VC 3510 Multipoint Control Unit (MCU) version 2.0 and embedded gatekeeper version 2.0. Use this release note in conjunction with the *Cisco IP/VC 3510 MCU User Guide Version 2*.



Note

If you are upgrading an MCU, please refer to the upgrade notes that come with the upgrade software also. The upgrade notes provide installation and configuration information that is not available in the *Cisco IP/VC 3510 MCU User Guide* or in these release notes.

For regulatory and compliance information on the Cisco IP/VC 3510 MCU, refer to the *Regulatory Compliance and Safety Information for Cisco IP/VC 3500 Series* document.

To access and configure the version 2.0 MCU, you must install Cisco IP/VC Configuration Utility version 1.9.0.6 or later.



Corporate Headquarters: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Copyright © 2000. Cisco Systems, Inc. All rights reserved.

78-10228-03

Contents

These release notes discuss the following topics:

- Introduction, page 2
- New and Changed Information, page 3
- Important Notes, page 4
- Resolved Caveats, page 7
- Open Caveats, page 7
- Documentation Updates, page 10
- Embedded Gatekeeper, page 17
- Related Documentation, page 21
- Service and Support, page 21
- Obtaining Documentation, page 22
- Obtaining Technical Assistance, page 22

Introduction

The Cisco IP/VC 3510 MCU is an H.323 device that allows H.323 endpoints to make multiparty videoconference calls. The Cisco IP/VC 3510 MCU comes with an embedded gatekeeper that can be used to provide address resolution, address translation, and bandwidth management functions.

New and Changed Information

New Features

The following sections list the new features in the Cisco IP/VC 3510 MCU version 2.0.

Autoregistration of Service Prefixes

This feature allows the MCU to automatically register its service prefixes with the H.323 version 2-compliant gatekeeper with which the MCU is registered.



Note

Autoregistration of services is not supported by the Cisco IP/VC embedded gatekeeper.

Continuous Presence

Continuous presence is a feature that allows multiple conference participants to be viewed simultaneously. The continuous presence option in the Cisco IP/VC 3510 MCU allows a conference to display up to four participants simultaneously.

H.263 Video Support

H.263 is a video compression standard that provides improved picture quality. MCU services can be created that use the H.263 standard.



Note

H.263 is not supported for continuous presence calls.

External T.120 Server Support

This feature allows the Cisco IP/VC 3510 MCU to work with an external T.120 server to provide coordinated audio, video and data streams to endpoints with T.120 capability. You must create MCU services that provide T.120 data

collaboration, and the MCU must be configured to use an external T.120 server. When an endpoint requests to share data with another endpoint during a conference, the MCU passes the request to the T.120 server, which opens a data channel with the endpoint. Any required processing of the T.120 data is provided by the T.120 server.

Currently, the only external T.120 server that has been tested and approved for use with the Cisco IP/VC 3510 MCU is the RADVision T.120 Server. See the *Cisco IP/VC 3510 MCU User Guide Version 2* for instructions on how to configure the MCU to use an external T.120 server. Refer to the external server documentation for information about the T.120 applications the server supports and instructions on how to configure the server.

Important Notes

Audio and Video Quality

Audio and video quality can affect the videoconference call. Factors involved in the quality include the audio bit rate, the video bit rate and endpoint capacity. The minimum videoconference-call goal is to have telephone-quality audio (64 kbps) and television-like video (30 full-color frames per second at 352 x 288 pixels per second). In H.320 videoconference environments, this goal is achieved at 384 kbps and higher.

The Cisco IP/VC 3510 MCU reserves 64 kbps for audio bit rate in all calls, ensuring that all MCU calls have telephone-quality audio. The video bit rate is configurable for each MCU service up to 1.5 Mbps. To provide television-like video comparable to that in the H.320 environment at 384 kbps, set the video bit rate parameter to 320 kbps or higher.

The final factor in video quality is the capacity of the endpoint to process the video stream. An endpoint that does not have the capacity to support the video bit rate set by the MCU service can have degradation in the video it displays. In some cases, lower-capacity endpoints can affect the video bit rate that the MCU sets for the videoconference ensuring that lower quality video is distributed to each of the participants. In an environment where there is a mixture of high and low-capacity endpoints, you can create a mixture of services to accommodate the different video bit rate capacities. Be sure to train the users on how to select the best service for the videoconference call the user wants to initiate.

T.120 Support

The Cisco IP/VC 3510 MCU provides two types of T.120 support: “Out of Band” T.120 support and support for external T.120 servers. This section describes the “Out of Band” support. External T.120 support is described in the “External T.120 Server Support” section earlier in this release note.

“Out of Band” T.120 support allows T.120 data to be exchanged between endpoints participating in an MCU videoconference call without the MCU being involved in the T.120 exchange. Both version 1 and version 2 of the Cisco IP/VC 3510 MCU support “Out of Band” T.120 using Microsoft NetMeeting-compatible applications through the Microsoft Internet Explorer Web browser. When an MCU-conference Web page is opened using Internet Explorer, participants with NetMeeting-compatible applications are identified in the web page. These endpoints can be enabled to exchange T.120 data with other T.120-capable endpoints participating in the conference. The T.120 data exchange among the endpoints is independent of the video and audio streams provided by the MCU.

Multicast Traffic

If your network is subjected to heavy multicast traffic, you may experience degradation in videoconference quality. The MCU may not be able to process all of the information that the switch sends. To avoid this problem, you can disable multicast on the switch port where the MCU resides or use standards-based IP Multicast filtering protocols such as Internet Group Membership Protocol (IGMP) or Protocol Independent Multicast (PIM). Refer to the switch documentation or protocol application for instructions on blocking multicast traffic.

Resource Distribution With MCM Gatekeeper

When using the Cisco MCM gatekeeper, do not assign the same service prefix to multiple MCUs. The MCM is not capable of line hunting or load balancing across multiple MCUs.

Zydacron 350 Endpoints

Zydacron 350 endpoints interpret “**” as a **dial now** command. To invite a terminal from a Zydacron 350 endpoint, type

*conference_password terminal_phone_number ***

Press the **Dial** button.

Place ** in the appropriate place.

NetMeeting Endpoints

The following have been observed with endpoints using NetMeeting.

Picture Format

NetMeeting users can only participate in conferences that use Quarter Common Intermediate Format (QCIF). If you anticipate that NetMeeting clients will participate in conferences, be sure to create MCU services that use the QCIF format.

Audio Quality

If you want to improve the audio quality of a NetMeeting endpoint, we recommend that you set the endpoint bandwidth by completing the following steps:

-
- | | |
|--------|---|
| Step 1 | From the NetMeeting main window, choose Tools > Options . |
| Step 2 | Click the General tab. |
| Step 3 | In the Network Bandwidth section, choose the field to display the drop-down list and choose ISDN . |
| Step 4 | Click OK . |
-

Resolved Caveats

Table 1 lists and describe caveats that are resolved in Cisco IP/VC 3510 MCU version 2.

Table 1 *Cisco IP/VC 3510 MCU Version 2 Resolved Caveats*

DDTS Number	Summary	Explanation
CSCdp21014	Invite field in the conference Web interface does not accept comma as a delimiter when inviting participants.	Fixed.
CSCdp21134	Slow Web response on IPVC 3510 when under load.	Fixed.
CSCdp31510	Extraneous lines of code appear in MCU conference Web page.	Fixed.

Open Caveats

Table 2 describes possible unexpected behavior by the Cisco IP/VC 3510 MCU.

Table 2 *Cisco IP/VC 3510 MCU Version 2 Open Caveats*

DDTS Number	Description
CSCds03843	Intermittent audio problem in an audio-only conference. Workaround: No workaround is available.
CDCdr05172	Conference bandwidth does not drop to the lower bandwidth. For conferences initiated using the dynamic video bit rate, the negotiated conference bandwidth is not lowered to accommodate LAN endpoints joining the conference that have bandwidth capacities lower than the established bandwidth. These endpoints display poor quality video. Workaround: Initiate call using a fixed video bit rate.

Table 2 Cisco IP/VC 3510 MCU Version 2 Open Caveats (continued)

DDTS Number	Description
CSCds16308	<p>Only seven MCU service prefixes are dynamically registered with the MCM gatekeeper.</p> <p>Workaround: Manually register the additional MCU service prefixes.</p>
CDCdr20273	<p>Flow control problem between IP/VC MCU and H.320 endpoints.</p> <p>When an IP/VC MCU is used to manage a multipoint conference that includes H.323 and H.320 endpoints, the H.323 endpoints can send more data through the IP/VC gateway than the H.320 endpoints can process.</p> <p>Workaround: Verify that all gateways participating in the call have the same audio transcoding capability.</p>
CDCdr21308	<p>Interoperability issue between Cisco MCM and IP/VC embedded gatekeepers.</p> <p>Endpoints registered to an IP/VC embedded-gatekeeper zone cannot use services provided by IP/VC MCUs and gateways registered to an MCM gatekeeper zone.</p> <p>Workaround: Setup the network so that the MCUs and gateways register with the embedded gatekeeper. Terminals can register with either gatekeeper.</p>
CDCdr50723	<p>Interzone MCU and gateway calls cannot go through proxy.</p> <p>When MCUs and gateways are registered to an embedded gatekeeper that proxy is also registered with, calls to another zone using the MCU or gateway are not completed.</p> <p>Workaround: Use Cisco MCM for both gatekeeper and proxy.</p>

Table 2 Cisco IP/VC 3510 MCU Version 2 Open Caveats (continued)

DDTS Number	Description
CSCdr85874	<p>Polycom unit invited to an MCU conference from a proxied zone does not display or send video.</p> <p>This occurs when using IP/VC MCU 2.0, MCM, and Polycom endpoints. It occurs when the Polycom endpoints are invited to the conference.</p> <p>Workaround: Contact your Polycom representative for information on upgrading the Polycom software.</p>
CSCdr92684	<p>Entering illegal numbers in subnet mask causes unit to lock up.</p> <p>Workaround: Contact Cisco technical support, obtain an RMA, and return the unit.</p>
CSCdr94859	<p>Poor video switching performance on some NetMeeting clients.</p> <p>Workaround: No workaround is available.</p>
CSCdr94867	<p>MCU conference ID does not display more than 16 characters.</p> <p>The conference ID field in the MCU Web interface displays the first 16 characters of the conference only.</p> <p>Workaround: No workaround is available.</p>

Documentation Updates

This section contains the latest documentation updates for version 2.0 of the Cisco IP/VC 3510 MCU. This update includes any changes or late-breaking information that occurred after production of the MCU and information that was omitted from the *Cisco IP/VC 3510 MCU User Guide Version 2*.

Setting the Order Which Participants Are Displayed in Continuous Presence Calls

The Cisco IP/VC 3510 MCU displays the participants of a continuous-presence videoconference call in a matrix of four squares. The call initiator and the first two participants to join or be invited to the call are displayed in three of the quadrants. The fourth quadrant is voice activated, displaying the remaining participant that speaks the loudest. This section describes how you can set the order of the quadrants in which the participants appear.

There are two orders in which the participants may appear: `vdocpmatrix1` and `vdocpmatrix2`.

Vdocpmatrix1 sets the quadrant order as follows:

- Conference initiator appears in the top right quadrant
- First participant appears in the bottom left quadrant
- Second participant appears in the bottom right quadrant
- Voice-activated participant appears in the top left quadrant

Vdocpmatrix2 sets the quadrant order as follows:

- Conference initiator appears in the top left quadrant
- First participant appears in the top right quadrant
- Second participant appears in the bottom left quadrant
- Voice-activated participant appears in the bottom right quadrant

`Vdocpmatrix1` is the factory default.

You can set the order of the quadrants in which participants are displayed using MCU advanced commands. To set the order, perform the following steps:

-
- Step 1** In Windows, choose **Start > Programs > Cisco IPVC Tools > Cisco Configuration Utilities**. The Cisco Configuration Utility appears.
- Step 2** Select the IP address of the MCU for which you want to set the quadrant order or enter the MCU IP address in the Unit IP field and click **Next**.
- Step 3** Proceed to the Miscellaneous Settings Window.
- Step 4** Click **Advanced**. The Advanced dialog box appears.
- Step 5** In the Command field, enter one of the following:
- **vdcpmatrix1**
 - **vdcpmatrix2**
- Step 6** Click **Send**.
- The command is executed, and a message appears in the Response field.
- Step 7** Click **Close**. The Miscellaneous window appears.
- Step 8** Click **Abort** to exit the configuration utility.
-

Manually Registering MCU Service Prefixes With the MCM Gatekeeper

The MCU automatically registers up to seven service prefixes with the MCM gatekeeper. You must register additional MCU service prefixes with the MCM manually. For information on how to configure the MCM gatekeeper, refer to *Configuring Gatekeepers (Multimedia Conference Manager)*.

To create a local zone, perform the following steps:

-
- Step 1** Log in.
- Step 2** At the prompt, enter
- enable**
- Press **Enter**.

- Step 3 At the Password prompt, enter
Enable password
- Step 4 At the prompt, enter
GK#: **configure terminal**
Press **Enter**.
- Step 5 At the prompt, enter
GK (config) #: **gatekeeper**
Press **Enter**.
- Step 6 At the prompt, enter
GK (config-gk) #: **gw-type-prefix MCU service prefix gw ipaddr**
MCU IP address 2720
Press **Enter**.
Where:
MCU service prefix is the MCU service prefix you want to register with the MCM gatekeeper.
2720 is signaling port the MCU uses.
- Step 7 At the prompt, enter
GK (config-gk) #: **no shutdown**
- Step 8 Press **Ctrl-Z** to exit configuration mode.
- Step 9 To save the configuration to memory, at the prompt, enter
copy running-config startup-config

Errors

The following sections identify and correct errors that appear in the *Cisco IP/VC 3510 MCU User Guide Version 2*.

Incorrect Statements

Table 3 corrects statements that are known to be incorrect in the *Cisco IP/VC 3510 MCU User Guide Version 2*. The table lists the page where the error is found, the original statement, and the correction.

Table 3 *Corrections to Cisco IP/VC 3510 MCU User Guide*

Page Number	Current Statement	Correction
1-2	Cisco IP/VC 3510 VTA	Cisco IP/VC 3530 VTA
5-2	To ensure optimum use of MCU resources, we recommend that the administrator create MCU services that support the least capable terminal in environment and that specify the smallest number of participants that are likely to participate in calls. Additional participants can be invited to the conference or can join it later.	To ensure optimum use of MCU resources, we recommend that the administrator create a mix of MCU services using a range of bandwidths and participants. Users should be trained to select the service that best fits the requirements of the conference they want to initiate.
5-3	The Cisco IP/VC 3510 MCU uses the H.263 standard to process continuous presence calls.	The Cisco IP/VC 3510 MCU uses the H.261 standard to process continuous presence calls.
5-3	The fourth quadrant is populated through voice activation by any of the remaining participants who is awarded the floor.	The fourth quadrant is voice activated and populated by the remaining participant who speaks the loudest.
5-5	An E.164 address is the dialing number used in IP networks for placing calls. The system administrator or user assigns a unique E.164 address to the endpoint. Other users dial the E.146 address to contact the endpoint.	An E.164 address is a dialing number assigned to the endpoint. It uses the numerals 0 through 9. Other users can dial the E.164 address to contact the endpoint.

Table 3 *Corrections to Cisco IP/VC 3510 MCU User Guide (continued)*

Page Number	Current Statement	Correction
5-12	<p>Step 2: In the Description field, enter a description for this service.</p> <p>The description can be up to 31 characters long. You can use the numbers 0 through 9 and the characters pound (#), asterisk (*), and comma (,).</p>	<p>Step 2: In the Description field, enter a description for this service.</p> <p>The description can be up to 31 characters long.</p>
5-16	<p>Step 3: In the Description field, enter a description for this service.</p> <p>The description can be up to 31 characters long. You can use the numbers 0 through 9 and the characters pound (#), asterisk (*), and comma (,).</p>	<p>Step 3: In the Description field, enter a description for this service.</p> <p>The description can be up to 31 characters long.</p>
5-34	It also provides a mechanism for you to enter MCU line commands.	It also provides a mechanism for you to enter MCU advanced commands.
6-13	This stream projects four quadrants on the recipient monitor, each displaying the image of a participant: the current speaker and the previous three speakers	This stream projects four quadrants on the recipient monitor, each displaying the image of a participant: the call initiator, the first and second participant to be invited to or to join the call, and the participant among the remaining participants who speaks loudest.

Table 3 Corrections to Cisco IP/VC 3510 MCU User Guide (continued)

Page Number	Current Statement	Correction
6-23	Step 1: Click the radio button of the participant on which you want to lock the conference.	Step 1: In the Web page for the conference hosting the participant, click the radio button of the participant on which you want to lock the conference.
6-23	Any Web user can enable participants with data-sharing capability to participate in data collaboration.	To initiate data sharing, open a Web page on a computer that does not have a NetMeeting client participating in the call.
A-1	The Cisco IP/VC3510 MCU must register with a gatekeeper on the network. The Cisco IP/VC3510 MCU version 2 unit can automatically register with H.323 version 2 gatekeepers.	The Cisco IP/VC 3510 MCU must register with a gatekeeper on the network. The Cisco IP/VC 3510 MCU version 2 unit can automatically register the services it supports with H.323 version 2 gatekeepers.
F-2	To determine the resource capacity a standard MCU service uses, use the following algorithm: $2 * (\text{video BW} + 64) * \text{\#participants} * \text{call weight} - 80,000$	To determine the resource capacity a voice-activated conference uses, use the following algorithm: $2 * (\text{video BW} + 64) * \text{\#participants} * \text{call weight}$
F-3	To determine the resource capacity a standard MCU service uses, use the following algorithm: $(5 * \text{video BW} + 128) * \text{\#participants} * \text{call weight} - 80,000$	To determine the resource capacity a continuous-presence conference uses, use the following algorithm: $(5 * \text{video BW} + 128) * \text{\#participants} * \text{call weight}$

Number of Participants for Continuous Presence

The user interface used to configure services with continuous presence specifies two video bit rate parameters: Video Bit Rate In and Video Bit Rate Out. Table 5-5 on page 5-16 does not specify which video bit rate is used to determine the maximum number of participants. Use the Video Bit Rate In value to do the calculation. Table 4 provides both values.

Table 4 *Continuous Presence Maximum Number of Participants per Video Bit Rate*

H.320 Conference Bit Rate Reference	Video Bit Rate Out	Video Bit Rate In	Maximum Number of Participants
128	64	16	12
256	192	48	12
384	320	80	12
448	384	96	10
512	448	112	8
640	576	144	8
768	704	176	6

Calculating the Maximum Number of Participants for MCU Services

Appendix F describes how you can calculate the maximum number of participants the MCU can support for MCU services. These algorithms are to be used to establish guidelines only. The actual maximum value you can set for a service is determined by the configuration utility. This section provides important information that is not provided in the user guide.

Maximum Number of Calls

The MCU allocates resources for each new conference prior to the conference start. A standalone MCU uses the multipoint controller (MC) and multiprocessor (MP) in a single box. A stacked MCU consist of an MC using up to four MPs (one MP can be in the box with the MC). To ensure that resource are allocated successfully, follow these guidelines:

- Number of video calls does not exceed 15 per MP
- Number of voice calls does not exceed 24 per MP
- Total bandwidth of traffic does not exceed 10 Mbps per MP
- Total weighted bandwidth of all conferences per MP does not exceed 80,000
- Number of calls (voice and video) does not exceed 48 per MC

Embedded Gatekeeper

The following sections provide information about the Cisco IP/VC embedded gatekeeper version 2.0.

New and Changed Information

New Features

The following sections list the new features in the version 2.0 embedded gatekeeper.

Cisco Proxy

This feature allows the embedded gatekeeper to connect to the proxy in the Cisco Multimedia Conference Manager (MCM). The proxy can provide quality of service (QoS) and firewall functions.

Multicast Gatekeeper Discovery

This H.323 feature provides a mechanism by which an endpoint can identify gatekeepers that it can register with.

Important Notes

Registering NetMeeting 2.x Endpoints

You must manually register endpoints that use NetMeeting version 2.x and earlier with the embedded gatekeeper. These versions of NetMeeting do not support automatic gatekeeper registration.

Resolved Caveats

Table 5 lists and describes caveats that are resolved in Cisco IP/VC embedded gatekeeper version 2.

Table 5 *Cisco IP/VC Embedded Gatekeeper Version 2 Resolved Caveats*

DDTS Number	Summary	Explanation
CSCdp21042	Embedded gatekeeper does not work with Cisco MCM proxy.	Fixed
CSCdp81231	If the zone prefix of the embedded gatekeeper is configured and enabled, the Cisco MCM cannot access the embedded gatekeeper to use a service. The MCM can only access and use embedded gatekeeper services when a zone prefix for the embedded gatekeeper is not used.	Duplicates CSCdp21308.

Open Caveats

Table 6 describes possible unexpected behavior by the Cisco IP/VC embedded gatekeeper.

Table 6 *Cisco IP/VC Embedded Gatekeeper Version 2 Open Caveats*

DDTS Number	Description
CSCdp21308	<p>Interoperability issues between Cisco MCM and IP/VC embedded gatekeeper.</p> <p>Endpoints registered to an IP/VC embedded-gatekeeper zone cannot use services provided by IP/VC MCUs and gateways registered to an MCM gatekeeper zone.</p> <p>Workaround: Setup the network so that the MCUs and gateways register with the embedded gatekeeper. Terminals can register with either gatekeeper.</p>

Documentation Updates

This section contains the latest documentation updates for version 2.0 of the Cisco IP/VC embedded gatekeeper. This update includes any changes or late-breaking information that occurred after production of the embedded gatekeeper and information that was omitted from the *Cisco IP/VC 3510 MCU User Guide Version 2*.

Saving Embedded Gatekeeper Parameters

The Cisco IP/VC Configuration Utility allows you to configure the gatekeeper separately from the MCU. This section describes how to save embedded gatekeeper configuration parameters.

To save a configuration table, perform the following steps:

-
- Step 1** Launch the Cisco IP/VC Configuration Utility.
 - Step 2** Log in to the Cisco IP/VC 3510 MCU that has the gatekeeper parameters you want to save.

- Step 3** Click **Gatekeeper** in the Configuration Source window.
 - Step 4** Click the application parameter configuration you want to save.
 - Step 5** Set the parameters as you want to save them in the table.
 - Step 6** Click **Save**. The Save As window appears.
 - Step 7** In the File name field, enter a name for the file you want to save. A predefined file extension is automatically applied for the gatekeeper parameter table you are saving. The extension for each gatekeeper parameter table is as follows:
 - .srv for Service Definition Table files
 - .zon for Zone Definition Table files
 - .nbr for Neighbor Gatekeeper Table files
 - .tpl for Network Topology Table files
 - .ctr for Network Control Table files
 - Step 8** Click **Save**.
-

Loading Saved Embedded Gatekeeper Parameters

The Cisco IP/VC Configuration Utility recognizes the embedded gatekeeper in the MCU, and allows you to configure the gatekeeper separately. This section describes how to load embedded gatekeeper parameters you have saved into the Cisco IP/VC Configuration Utility to use to restore the current embedded gatekeeper parameters or configure another embedded gatekeeper.

To load saved embedded gatekeeper table configuration parameters into the configuration utility, perform the following steps:

-
- Step 1** Launch the Cisco IP/VC Configuration Utility.
 - Step 2** Log in to the Cisco IP/VC 3510 MCU that has the parameters you want to load.
 - Step 3** Select **Gatekeeper** in the Configuration Source window.
 - Step 4** Click the application into which you want to load the saved parameters.

Step 5 Click **Load**. The Open dialog box appears.

The Open dialog box lists files in the appropriate Cisco IP/VC directory that you can load. The file type is preselected. The file types are as follows:

- .srv for Service Definition Table files
- .zon for Zone Definition Table files
- .nbr for Neighbor Gatekeeper Table files
- .tpl for Network Topology Table files
- .ctr for Network Control Table files

Step 6 Select the file you want to load.

Step 7 Click **OK**. The parameters are loaded into the Cisco IP/VC Configuration Utility.

You can use the file you load as is or modify the parameters. The parameters can be written to Flash memory when you exit the definition table.

Related Documentation

Use these release notes in conjunction with the following documents:

- *Cisco IP/VC 3510 MCU User Guide Version 2*
- *Regulatory Compliance and Safety Information for Cisco IP/VC 3500 Series*
- *Configuring Gatekeepers (Multimedia Conference Manager)*

Service and Support

For service and support, contact Cisco Technical Assistance Center (TAC) at:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Obtaining Documentation

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly. Therefore, it is probably more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Registered CCO users can order the Documentation CD-ROM and other Cisco Product documentation through our online Subscription Services at <http://www.cisco.com/cgi-bin/subcat/kaojump.cgi>.

Nonregistered CCO users can order documentation through a local account representative by calling Cisco's corporate headquarters (California, USA) at 408 526-4000 or, in North America, call 800 553-NETS (6387).

Obtaining Technical Assistance

Cisco provides Cisco Connection Online (CCO) as a starting point for all technical assistance. Warranty or maintenance contract customers can use the Technical Assistance Center. All customers can submit technical feedback on Cisco documentation using the Web, e-mail, a self-addressed stamped response card included in many printed docs, or by sending mail to Cisco.

Cisco Connection Online

Cisco continues to revolutionize how business is done on the Internet. Cisco Connection Online is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

CCO's broad range of features and services helps customers and partners to streamline business processes and improve productivity. Through CCO, you will find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online support services, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on CCO to obtain additional personalized information and services. Registered users may order products, check on the status of an order and view benefits specific to their relationships with Cisco.

You can access CCO in the following ways:

- WWW: www.cisco.com
- Telnet: cco.cisco.com
- Modem using standard connection rates and the following terminal settings: VT100 emulation; 8 data bits; no parity; and 1 stop bit.
 - From North America, call 408 526-8070
 - From Europe, call 33 1 64 46 40 82

You can e-mail questions about using CCO to cco-team@cisco.com.

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to warranty or maintenance contract customers who need technical assistance with a Cisco product that is under warranty or covered by a maintenance contract.

To display the TAC Web site that includes links to technical support information and software upgrades and for requesting TAC support, use www.cisco.com/techsupport.

To contact by e-mail, use one of the following:

Language	E-mail Address
English	tac@cisco.com
Hanzi (Chinese)	chinese-tac@cisco.com
Kanji (Japanese)	japan-tac@cisco.com
Hangul (Korean)	korea-tac@cisco.com
Spanish	tac@cisco.com
Thai	thai-tac@cisco.com

In North America, TAC can be reached at 800 553-2447 or 408 526-7209. For other telephone numbers and TAC e-mail addresses worldwide, consult the following Web site:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

Cisco Systems, Inc.
 Document Resource Connection
 170 West Tasman Drive
 San Jose, CA 95134-9883

We appreciate and value your comments.

This document is to be used in conjunction with the *Cisco IP/VC 3510 MCU User Guide Version 2* publication.

Access Registrar, AccessPath, Are You Ready, ATM Director, Browse with Me, CCDA, CCDE, CCDP, CCIE, CCNA, CCNP, CCSI, CD-PAC, *CiscoLink*, the Cisco NetWorks logo, the Cisco Powered Network logo, Cisco Systems Networking Academy, Fast Step, FireRunner, Follow Me Browsing, FormShare, GigaStack, IGX, Intelligence in the Optical Core, Internet Quotient, IP/VC, iQ Breakthrough, iQ Expertise, iQ FastTrack, iQuick Study, iQ Readiness Scorecard, The iQ Logo, Kernel Proxy, MGX, Natural Network Viewer, Network Registrar, the Networkers logo, *Packet*, PIX, Point and Click Internetworking, Policy Builder, RateMUX, ReyMaster, ReyView, ScriptShare, Secure Script, Shop with Me, SlideCast, SMARTnet, SVX, TrafficDirector, TransPath, VlanDirector, Voice LAN, Wavelength Router, Workgroup Director, and Workgroup Stack are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, Empowering the Internet Generation, are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, Cisco, the Cisco Certified Internetwork Expert Logo, Cisco IOS, the Cisco IOS logo, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Collision Free, Enterprise/Solver, EtherChannel, EtherSwitch, FastHub, FastLink, FastPAD, IOS, IP/TV, IPX, LightStream, LightSwitch, MICA, NetRanger, Post-Routing, Pre-Routing, Registrar, StrataView Plus, Stratum, SwitchProbe, TeleRouter, are registered trademarks of Cisco Systems, Inc. or its affiliates in the U.S. and certain other countries.

All other brands, names, or trademarks mentioned in this document/website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any of its resellers. (0008R)

Copyright © 2000, Cisco Systems, Inc.
All rights reserved.

